

Denali

National Park and Preserve
United States Department of the Interior
National Park Service

EDUCATION PACKET FOR STUDENTS AND TEACHERS

Thank you for your interest in Denali National Park and Preserve. Denali is an excellent area for observing wild animals in their natural surroundings. This park was originally established as Mt. McKinley National Park in 1917 to protect wildlife and its habitat. At that time there were many people living and hunting in this area, and they needed meat for themselves and their dog teams. The easiest source of meat was hunting Dall sheep.

Charles Sheldon, a hunter and naturalist, came to the Denali area in 1906 to study Dall sheep. Seeing the need to protect this area and the Dall sheep from commercial hunting, in which harvested wildlife was marketed in quantity, Sheldon lobbied Congress to set the area aside as a national park. Congress agreed with Sheldon, and on February 26, 1917, about 2 million acres of an area including the highest point in North America were set aside as Mt. McKinley National Park. In 1980, through the Alaska National Interest Lands Conservation Act, the park's name was changed, and its acreage was tripled, so that today Denali National Park and Preserve covers more than 6 million acres. Almost the entire original 2 million acres are designated a wilderness area. More than 425,000 people visit this world-class national park every year.

WILDERNESS

How would you explain to someone what a wilderness is? It is a place where you can look in all directions and see no roads or buildings, where only animals live. It is where there is enough room for a caribou herd to roam freely and for wolves to hunt, without human interference. The wilderness of Denali is an intact ecosystem, a natural, wild home to plants and animals.



The National Park Service has been assigned the task of protecting and preserving this wilderness. Visitors are asked not to litter, damage the land, or remove anything that belongs here. As is the case with most national park areas, visitors may not hunt or harass animals in the wilderness area. In order to reduce traffic and noise, buses transport visitors into the park.

This is one of the last places left on our planet that is truly a wilderness.

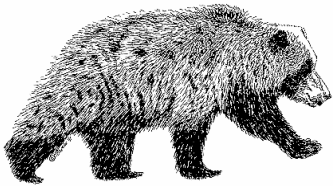
WILDLIFE

Dall Sheep

Ovis dalli dalli



Denali's mountain sheep are well known for their pure white coats and the ram's beautiful curling horns. Sheep live on the high mountain ridges, where they usually are safe from their main predators, wolves. During the winter these sheep live on wind-swept slopes, some of the coldest places in the park! The strong winds blow the snow away, allowing the sheep to find food. During the summer they feed on the small plants of the alpine tundra. These animals are sure-footed as they run along steep cliffs and rocky ledges. Even the young lambs run and play in places we wouldn't dare venture. Denali is the only place in Alaska in which the entire range of a Dall sheep herd, everywhere it roams, is protected from hunting all year long.



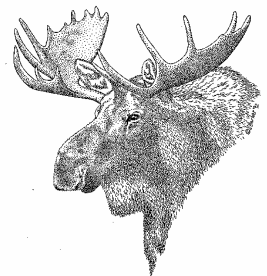
Grizzly Bear

Ursus arctos

Grizzlies in Denali are not as large as other grizzlies, weighing about 350-450 pounds. They are known as omnivores, but they feed mostly on vegetation--roots in the spring, grasses and herbs in the summer, and berries in the fall. They sometimes hunt and eat moose calves in early spring, and are often seen trying to catch ground squirrels--but are only occasionally successful. In late fall, when the vegetation is covered with snow, the bears enter dens they have dug into hillsides and hibernate until springtime. They will be fasting all winter, so it is important for them to eat plenty of berries in the fall. Bears generally lose one-third of their weight during hibernation. A female grizzly, or sow, usually gives birth every three years, during the winter. She may emerge from her den in the spring with one, two, or three new cubs. The cubs usually stay with their mother for two and a half years before she chases them off; it is time for her to mate again. Sows are protective of their young and may perceive people who venture too near as a threat to their cubs. It is extremely important not to let bears get a taste of human food because once they do, they often become aggressive in attempts to obtain more. While in the park, backpackers carry their food in special bear-resistant food containers. However, most people who visit Denali during the summer see grizzlies from the window of a bus.

Moose

Alces alces gigas



Moose are the largest members of the deer family--and the moose in Alaska are the biggest moose in the world! A full-grown Alaskan bull moose may weigh 1,500 pounds, and his antlers alone may weigh 80 pounds. Moose gain their weight by eating lots of willow leaves, which are especially nutritious in early spring. In summer, moose may be seen in lakes and ponds, feeding on underwater vegetation. They are fairly solitary animals except in the fall during the rutting (breeding) season. At that time, the bulls challenge and sometimes fight with one another to "win" cows (female moose). Winners then mate with the cows, and the result is that stronger, healthier calves are born the following spring.

MORE WILDLIFE



Caribou

Rangifer tarandus

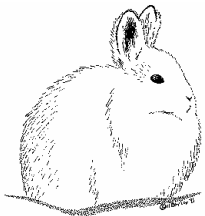
Caribou are sometimes called the deer of the north. They are a member of that family and are the only deer found as far north as the Arctic Circle and well beyond. Caribou are gregarious animals, meaning they live together in large herds. They also are migratory animals; they constantly travel throughout their home range (all the land they use during the course of a year). They migrate from the spring calving grounds, where the new calves are born, to the summer feeding grounds. Then they travel to the fall rutting grounds, and finally to the area where they spend the winter. Because of this migratory way of life, it

is very important that the Denali caribou herd has plenty of space, without obstructions or barriers to hinder its migration. Try to imagine a hundred caribou slowly moving together across the tundra!

Wolves

Canis lupus

Because they tend to avoid humans, wolves are only occasionally observed by park visitors. Wolves live in groups called packs, which usually consist of a dominant male and female (known as alphas), several other adult wolves, and perhaps a few pups. Caribou, moose, and sometimes a sheep provide the main sources of food for the wolves. Since the members of the pack hunt together as a team, they are fairly successful hunters. Weaker prey animals are the easiest to catch, while the stronger, healthier ones escape. Can you understand how the wolves help keep the caribou herd strong?



Snowshoe Hare

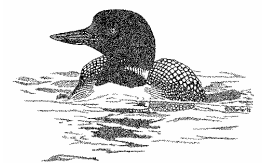
Small Mammals

Denali visitors are delighted to learn that the park is home not only to large mammals but also to smaller ones, as well. Arctic ground squirrels are small squirrels whose antics often are likened to those of prairie dogs. Ground squirrels live in underground burrows, and they sometimes make a tasty, 2,000-calorie snack for grizzlies and wolves. Red squirrels are noisy tree dwellers living in spruce trees and feeding on spruce cones. Beavers build dams and lodges in streams and ponds. Snowshoe hares are forest-dwellers whose brown summer coats turn pure white in winter. Pikas are tiny rabbit-like animals whose family is more than

15 million years old and probably reached North America by crossing the Bering Land Bridge. Marmots are large rodents that live in rock piles high up in sheep country. The diets of medium-sized mammals such as wolverines and lynx include many of these smaller animals. Each animal has a place in Denali's community and deserves to have its home protected.

Birds

Many birds fly north for the summer and south for the winter, and many use Denali as a place to nest and raise their young. The Arctic tern, for example, flies all the way from Antarctica each summer to nest here! Why the long journey? It could be that in Denali these migrant birds can be sure to find plenty of space, good nesting places, and enough food. Golden plovers, wheatears, surf birds, and long-tailed jaegers are examples of other birds that also travel great distances to spend the summer in Denali.



Common Loon

Species/ Population In Denali	Migration Trends	Food	Life History	Weight, Size, Longevity	Other (Male, Female, Young, Group)
Moose <i>Alces alces gigas</i> 2,000-2,200	“Local” to river bottoms and willow patches. May cover 20-40 miles.	Herbivore. Spring: sedges, grasses, equisetum, pond weeds. Summer: willow, aspen, birch, pond plants. Winter: twigs, bark, saplings.	Gives birth to first offspring at 2-3 years old. Mating season Sept.–Oct. Gestation is 8 months. 1-3 calves born in May or June, 28-35 pounds.	Male: 1,000-1,600 pounds. Female: 800-1,200 pounds. Height 7.5 feet at shoulders. Lives 17-20 years.	Bull, cow, calf. Largest member of deer family in North America. Wolf is only effective predator. Alaska population is 130,000-160,000.
Caribou <i>Rangifer tarandus</i> 2,100	Summer: along park road and southeast. Winter: north and northwest. Calving above treeline, southwest.	Herbivore. Summer: willow, dwarf birch, grasses, sedges. Winter: lichens, moss, dried sedges.	Gives birth to first offspring at 3 years old. Mating season in October. Gestation is 8 months. 1 calf born in May or June, 10-15 pounds.	Male: 350-400 pounds. Female: 175-225 pounds. 3.5-4 feet at shoulders. Lives 11-12 years.	Bull, cow, calf, herd. Only member of deer family in which both male and female have antlers. Newborn calf can walk after one hour, run at 2 days.
Dall Sheep <i>Ovis dalli dalli</i> 2,000	“Local” to high tundra near rock outcrops. Migrate between Alaska Range and Outer Range.	Herbivore. Summer: avens, flowers, grasses, willows, sedges. Winter: mosses, lichens.	Gives birth to first offspring at 3 years old. Mating in Nov.- Dec. Gestation is 6 months. 1 lamb is born in May or June.	125-200 pounds. 3-3.5 feet at shoulders. Lives 11-14 years.	Ram, ewe, lamb, band. Nursery gatherings May- June. Horns are never shed; rings on horns give age. Wolf is main predator.
Grizzly Bear <i>Ursus arctos</i> 200-300	“Local”	Omnivore. Roots, grasses, berries (80-85%). Ground squirrel, moose calf, caribou calf, rodents, carrion (15-20%).	Gives birth to first offspring at 4 to 6 years old. Mating May- July. Gestation is 6 months. 1 or 2 cubs born in Jan.–Feb. at less than 2 pounds.	Male: 300-500 pounds. Female: 200-400 pounds. 6-7 feet standing. Lives 16-20 years.	Boar, sow, cub, pack or sloth. Grizzlies enter den in October, emerge in April-May. Temperatures drop only 5-10 degrees during dormancy.

Species/ Population In Denali	Migration Trends	Food	Life History	Weight, Size, Longevity	Other (Male, Female, Young, Group)
Gray Wolf <i>Canis lupus</i> 80-100 individuals 15-20 packs	“Local”	Carnivore: rodents, hares, beaver, birds, moose, caribou, sheep, carrion.	Gives birth to first offspring at 2 years old. Mating in February and March. Gestation is 9 weeks. 2 to 10 pups born in May.	Male: 85-115 pounds. Female: 75-105 pounds. 2.5 feet tall at shoulders. Lives 9-12 years.	Dog, bitch, pup, pack. Color varies from black to white; gray is most common. 200-600-square mile territory per pack.
Red Fox <i>Vulpes vulpes</i> No estimate	“Local”	Omnivore: voles, lemmings, squirrels, hares, birds, berries, eggs.	Gives birth to first offspring at 1 to 2 years old. Mating in February and March. Gestation is 7 weeks. 1 to 4 kits.	6-15 pounds. 22-25 inches long. 14-16-inch tail. Lives 10-14 years.	Dog, vixen, kit or pup, family. Silver, cross, and other color variations are all red fox. Dens extend 15-20 feet underground.
Lynx <i>Lynx canadensis</i> No estimate	“Local” usually below the tree line.	Carnivore: hares, squirrels, ptarmigan, rodents, carrion.	Gives birth to first offspring at 1 year old. Mating in Jan.- Feb. Gestation is 8 weeks. 1-4 kittens born March to May.	11-35 pounds. 3 feet long. 4-inch tail. Lives 11-18 years.	Male, female, kitten. Hare is main food source. Nocturnal. Population cycles with hares. Kittens’ cry similar to a Gyr Falcon.
Hoary Marmot <i>Marmota caligata</i> No estimate	“Local” burrow in rock outcrops.	Herbivore: grasses, flowering plants, berries, roots, mosses, lichens.	Gives birth to first offspring at 2 years old. Mating March through May. Gestation is 5 weeks. 2 to 6 babies born May to June.	8-20 pounds. Maximum 30 pounds. 20-24 inches long. Maximum 31 inches long. Lives about 5 years.	Warning whistle can be heard 2 miles away. Hibernates September to April. Wakes up every 2 weeks to eat and defecate.

MOUNT MCKINLEY

Mt. McKinley, also known as “Denali” in an Athabaskan dialect, means “the high one.” It is North America’s highest peak, and stands guard over Denali National Park at 20,320 feet tall. It is part of the mountain chain called the Alaska Range. On Mt. McKinley there are many glaciers, some as long as 30 miles. Most mountain climbing in the Alaska Range takes place from the first week in May to the first week in July, during the best weather of the year. The highest summit success rate is in June. Most climbs on Mt. McKinley take about 14 days; however, some last as long as five weeks, due to bad weather. Weather on the mountain can be severe, with snowstorms, white-out conditions, and winds in excess of 100 mph, sending the wind chill to as low as minus 100° F. Or it can be calm and sunny with temperatures in the 80s.

Some Mt. McKinley mountaineering facts:

Tallest mountain in North America, 20,320 feet (South Peak).

First summit of North Peak: Taylor and Anderson, April 3, 1910.

First summit of South Peak (true summit): Harper, Karstens, Stuck, and Tatum, June 7, 1913.

Average summit success rate: 52%.

Most climbers in one season: 1,340 in 2005.

First woman to summit: Barbara Polk Washburn, June 6, 1947.

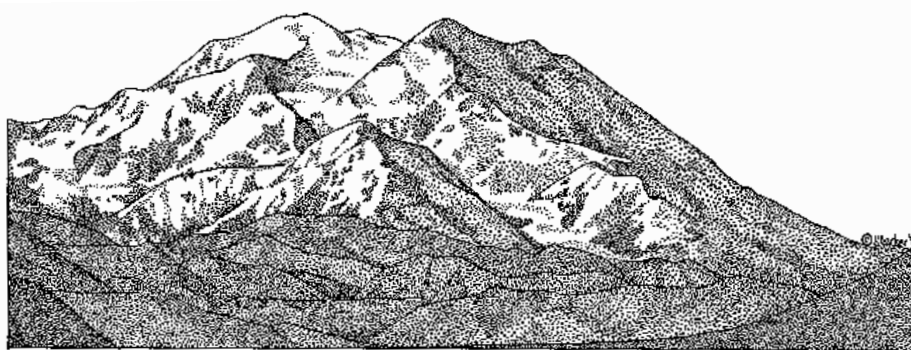
First solo ascent: Naomi Uemura, August 26, 1970.

First solo *winter* ascent: Naomi Uemura, February 12, 1984 (died on descent).

Youngest climber to summit: 11-year-old Galen Johnston, June 17, 2001.

Oldest climber to summit: 74-year-and-one-month-old Sadao Hoshiko, June 2005.

Between June 7, 1910 and September 2005, 30,049 climbers attempted to summit; 15,614 succeeded; 95 climbers lost their lives.



Mt. McKinley, underneath its sheath of glaciers, consists primarily of a granite dome. About 60 million years ago (Paleocene epoch), semi-liquid magma intruded below the surface of the earth, and slowly cooled from 100 degrees Centigrade to form the McKinley **pluton** (a body of igneous rock formed beneath the surface of the earth by consolidation of magma). The pluton composing Mt. McKinley’s neighboring peaks is considerably younger, 38 million years old. As the millennia went by, a sea covered the area where the park is today and deposited much sediment. Later, a tropical forest grew here, resulting in the coal-bearing formation which is mined near the park today. Eventually geological forces caused the land to rise and buckle, resulting in the **metamorphic rock** (rock that has been transformed from one type of rock to another by heat and pressure) sequences found in the park. Much more recently, two to five million years ago, the McKinley pluton and the metamorphic rock lying on top of it were uplifted to the great height of today, forming the Alaska Range and Mt. McKinley.

GEOLOGY

Floating oceans and continents: The theory of Plate Tectonics

Who has not looked at Africa and South America and thought to himself or herself that the two continents look as if they fit together? According to Plate Tectonics theory, they did! In this theory, the crust of the earth, the continents, and the rocks that hold the oceans are plates floating on a layer of molten rock. The crust is not all in one piece, like an unbroken egg shell, but more like a ball completely covered by the plates floating on the molten rock. Plates are constantly moving, but very slowly. In some places the plates are crashing into each other or converging. In others, the plates are moving apart or diverging. If you drained the oceans, the earth would look like a giant baseball with seams. The seams are the edges of the separating plates. Mountain ranges like the Himalayas and the Alaska Range mark the area where plates are crashing together.

Moving mountains: The formation of the park

Imagine the Pacific Plate, the plate that contains the Pacific Ocean, as a conveyor belt continuously bringing the ocean floor to the North American Continental plate. The second plate is like a bulldozer scraping off the surface of the Pacific Plate. Alaska, as part of the North American Continental plate, is the recipient of some of these scrapings. Thus, what were once Pacific Islands and deep sea sediments now are land formations. In addition, the immense pressure of these moving land masses causes the land to buckle and warp. The combination of forces causes the land to rise up and form the Alaska Range, a mountain range that is still rising about three centimeters a year.

The Denali Fault

Visible ridges in the crust of the earth, **fault zones**, mark where plates are crashing into each other. Alaska contains the longest crustal ridge in North America: the 600-mile Denali Fault. This extensive fault zone starts at the coast of the Bering Sea and arches through the state, moving into the ocean south of Juneau. Near Park Headquarters, you can see the Hines Creek portion of the Denali Fault.

So...why is Mt. McKinley so tall?

Some of the molten rock cooled in large pools called **batholiths** (large masses of igneous rock that have melted and intruded surrounding strata at great depths). The slowly-cooled rock, granite, is resistant to the effects of wind, water, and ice. Mt. McKinley is a batholith that was once deep in the earth. As the tectonic plates shifted, it pushed through the softer rock surrounding it to the surface and up to 20,320 feet, creating the tallest mountain in North America. This granite mountain contains some of the most dramatic rises in the world, such as the 15,000-foot Wickersham Wall. While water and wind have taken their toll on most of the softer sedimentary rock, some of this rock still remains, like a lovely hat capping the top of the North Peak.

The process never stops

Even as the Alaska Range continues to rise, ice, running water, and wind wear down the mountains. Streams carry the sediment out into the Gulf of Alaska, the Bering Sea, or the Arctic Ocean, where it settles, and, given time, will begin the whole process anew.

VEGETATION

Denali National Park is located at 63 degrees latitude, about 200 miles south of the Arctic Circle. The vegetation is characteristic of many circumpolar landscapes. Temperatures and humidity fluctuate widely. The growing season is fewer than 100 days. Freezing temperatures and snowstorms are a possibility at any time during the growing season. **Permafrost** (ground that is frozen for two or more consecutive years) is found in many places and produces poorly drained, deoxygenated soils. This seemingly harsh climate has allowed several climatically durable plant communities to evolve.

The lowest in elevation of these plant communities is the **boreal forest** (sometimes also called **taiga**). The dominant plants here are the white spruce (*Picea glauca*); black spruce (*P. mariana*) are common in areas with poorly drained soil. Other boreal trees include aspen (*Populus tremuloides*), balsam poplar (*P. balsamirera*), paper birch (*Betula papyrifera*), and tamarack (*Larax sp.*). The forest floor is vegetated with a variety of low shrubs, including blueberries (*Vaccinium sp.*), crowberries (*Empetrum sp.*), wild rose (*Rosa sp.*), and low-bush cranberries (*Vaccinium sp.*). Boreal trees are slow growing; a tree 50 feet tall, 15 inches in diameter may be 400 years old. **Timberline** in Denali occurs at 2,500-2,800 feet and is the elevation where the mean temperature in July is 50 degrees. At this elevation **moist tundra** replaces the boreal forest. In Denali, dwarf birch (*Betula nana*) and many varieties of willow (*Salix sp.*) form a dense, knee-to-waist-high ground cover. Above the wet tundra is the third major plant community, dry alpine tundra.



**Chiming Bells,
AKA Bluebells,
Mertensia paniculata:
a favorite snack
of Discovery Hikers**

Alpine tundra occurs at varying elevations throughout the world. In Denali it usually occurs above 3,400 feet on well-drained soils. It is two to three inches thick, is perhaps Denali's most attractive plant community, and surely is the easiest for foot travel. Dry tundra consists of dwarf perennials such as avens (*Dryas sp.*), heathers (*Cassiope sp.*), cinquefoil (*Potentilla sp.*), and saxifrage (*Saxifraga sp.*). Tundra begins to bloom in mid-June and takes the appearance of a vast green blanket, with white, yellow, and pink decorations. These plants have a short growing season and may not produce seeds every season.

In addition to these major plant communities, there exist several special vegetation types produced by local conditions or **micro-climates**. One of these micro-climates, the gravel bars, characterizes the major rivers in the park. Centuries of shifting river channels, gravel deposition, and intermittent flooding have produced a unique plant community. Legumes such as pea vine (*Hedysarum sp.*), oxytrope (*Oxytropis sp.*), and dwarf fireweed (*Epilobium sp.*) colonize the gravel surface. The river bar environment is one of the harshest available to plants. There are no barriers to wind, and these plants may be abruptly wiped out by flooding and shifting river channels.

Although from the human perspective conditions in Denali National Park and Preserve are extremely harsh, these plants have been sculpted by **sub-arctic** extremes. The plants occurring here are finely adapted to climatic conditions of the far north. To a sub-arctic plant, Denali has a perfect climate!

HISTORY TIMELINE

15,000-30,000 years ago—Humans first cross to Alaska from Asia via the Bering Land Bridge.

11,000-12,000 years before present—Archeological sites show evidence of seasonal hunters and gatherers in the area.

1867—The United States purchases Alaska from Russia for two cents an acre, a total of 7 million dollars.

1896—William Dickey, a gold prospector, names Mt. McKinley after Ohio's William McKinley, a presidential candidate who supported the gold standard.

1903—Judge James Wickersham makes first attempt to climb Mt. McKinley, and stakes a gold claim in Kantishna.

1906—Charles Sheldon visits the region to study Dall Sheep.

1907-1908—Charles Sheldon and Harry Karstens develop the concept for Mt. McKinley National Park.

1910—The Sourdough Expedition's Tom Lloyd, Billy Taylor, Pete Anderson, and Charley McGonagall ascend toward the North Peak of Mt. McKinley. Only Taylor and Anderson reach the 19,470-foot summit.

1913—Hudson Stuck, Harry Karstens, Walter Harper, and Robert Tatum reach the 20,320-foot South Peak, the true summit of Mt. McKinley.

1917—Congress establishes Mt. McKinley National Park.

1921—Harry Karstens becomes the park's first superintendent; he is stationed in Nenana (70 miles north of the park entrance).

1923—The Alaska Railroad now runs from Seward to Fairbanks, dropping visitors at McKinley Park Station for the Savage River Tourist Camp.

1924—Air travel begins in the park.

1938—The Park Road now runs to Wonder Lake.

1932—Glacier piloting begins.

1939—The Park Hotel opens.

1939-1941—Adolph Murie conducts an extensive and famous study of the park's wolves.

1959—Alaska becomes a state; Eielson Visitor Center opens.

1960—Bradford Washburn publishes his map of Mt. McKinley, the fruit of fifteen years of exploration, surveying, master cartography, and artistic production. This map remains the standard for climbers today.

1972—The Parks Highway now connects Anchorage and Fairbanks; the National Park Service institutes the shuttle bus system. The Park Hotel burns to the ground and is replaced by a temporary structure—which lasts nearly thirty years.

(Continued on Next Page)

HISTORY TIMELINE, CONT'D.

1980—Congress approves the Alaska National Interest Lands Conservation Act (ANILCA), enlarging the park to 6.6 million acres and renaming it Denali National Park and Preserve.

1985—A court order imposes an injunction on mining in Kantishna until an Environmental Impact Statement (EIS) is completed; the EIS is finished in 1990, and the National Park Service decides to buy out many mining claims.

2002—The park sells the hotel, which is removed from the park. The hotel auditorium, for example, is sold to “the blue church” on the Parks Highway north of Healy, where it remains to this day.

2004 and on—In the wake of the removal of the Park Hotel, front-country construction continues. The Murie Science and Learning Center hosts its grand opening in August. The Denali Visitor Center opened in May 2005. In the backcountry, Eielson Visitor Center closes, to be re-opened in a brand-new facility in 2008.

FACT SHEET

Established

February 26, 1917 (as Mt. McKinley National Park)

December 2, 1980: increased in size, and name changed to Denali National Park and Preserve

Size

Park	4,690,866 acres	7,329.5 square miles
Preserve	1,337,988 acres	2,090.4 square miles
Total	6,028,754 acres	9,419.9 square miles
For size comparison:	Massachusetts	8,284 square miles
	New Hampshire	9,279 square miles
	Vermont	9,609 square miles

Wildlife Species

Amphibians	1 (wood frog)
Mammals	39
Birds	166 (one endangered species, Peregrine Falcon)
Fish	14, includes three salmon species
Reptiles	0

Lakes and Streams

Largest is Chilchukabena Lake: 2.6 miles long, two miles wide, 2,079 acres

Wonder Lake: 2.6 miles long, 1/2 mile wide, 280 feet deep (maximum), 649 acres

The park and preserve boast about 12,130 lakes and ponds, and 18,679 miles of streams.

Glaciers

Seventeen percent of the park's land area is covered with glaciers. The largest glaciers are on the south side of the Alaska Range (the Kahiltna, Ruth, Eldridge, Tokositna, and Yentna each are between 35 and 40 miles long). The largest glacier on the north side of the Alaska Range is the Muldrow, on Mt. McKinley, 34 miles long. The deepest measured glacier is the Ruth, at 3,805 feet or 1,160 meters; the surface ice of the Ruth moves about 3.1 feet or .95 meters each day.

Weather

Average annual precipitation: 15 inches at park headquarters

Wettest months: June, July, and August

Average annual snowfall: 78 inches at park headquarters

Most snowfall: October and November

Coldest temperature recorded at headquarters: -54° F, 2/11/99; average January temperature, 2° F

Warmest temperature recorded at headquarters: 91° F, 6/22/91; average July temperature, 55° F

Shortest day: December 21: 4 hours, 21 minutes of daylight

Longest day: June 21: 20 hours, 49 minutes of daylight

VOCABULARY LIST

Ath·a·bas·kan or **Ath·a·bas·can** (âth´e-bàs¹ken) also **Ath·a·pas·can** (-pàs¹-) *noun* **1.** A group of related North American Indian languages including the Apachean languages and languages of Alaska, northwest Canada, and coastal Oregon and California. **2.** A member of an Athabaskan-speaking people.

car·ni·vore (kär¹ne-vôr´, -vor´) *noun* A flesh-eating animal.

car·ri·on (kàr¹ê-en) *noun* Dead and decaying flesh.

er·rat·ic (î-ràt¹ík) *noun* A boulder transported from its original resting place by a glacier.

hi·ber·nate (hì¹ber-nât´) *verb, intransitive* **1.** To pass the winter in a dormant or torpid state. **2.** To be in an inactive or dormant state or period.

li·chen (lì¹ken) *noun* A fungus, usually of the class Ascomycetes, that grows symbiotically with algae, resulting in a composite organism that characteristically forms a crust-like or branching growth on rocks or tree trunks.

mag·ma (màg¹me, mäg¹-) *noun* *Geology* The molten rock material under the earth's crust, from which igneous rock is formed by cooling.

mas·sif (mà-sêf¹) *noun* **1.** A large mountain mass or compact group of connected mountains forming an independent portion of a range. **2.** A large section or block of the earth's crust that is more rigid than the surrounding rock and has been moved or displaced as a unit.

mi·grate (mì¹grât´) *verb, intransitive* To change location periodically, especially by moving seasonally from one region to another.

om·niv·o·rous (òm-nîv¹er-es) *adjective* Eating both animal and vegetable foods.

per·ma·frost (pûr¹me-frôst´, -fròst´) *noun* Permanently frozen subsoil, occurring throughout the Polar Regions and locally in perennially frigid areas.

plate tectonics *noun (used with a sing. verb).* A theory of global dynamics having to do with the movement of a small number of semi-rigid sections of the earth's crust, with seismic activity and volcanism occurring primarily at the margins of these sections. This movement has resulted in continental drift and changes in the shape and size of ocean basins and continents.

ru·mi·nant (rì¹me-nent) *noun* Any of various hoofed, even-toed, usually horned mammals of the suborder Ruminantia, such as cattle, sheep, goats, deer, and giraffes, characteristically having a stomach divided into four compartments and chewing a cud consisting of regurgitated, partially digested food.

sed·i·men·ta·ry (sèd´e-mèn¹te-rê, -mèn¹trê) *adjective* **1.** Of, containing, resembling, or derived from sediment. **2. *Geology*** Of or relating to rocks formed by the deposition of sediment.

sub·arc·tic (sùb-ärk¹tík, -är¹tík) *adjective* Of or resembling regions just south of the Arctic Circle.

tun·dra (tùn¹dre) *noun* A treeless area between the icecap and the tree line of Arctic regions, having a permanently frozen subsoil and supporting low-growing vegetation such as lichens, mosses, and stunted shrubs.

un·gu·late (ùng¹gye-lît, -lât´) *adjective* **a.** Having hoofs. **b.** Resembling hoofs; hoof-like.

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Mountaineering

www.nps.gov/dena/home/mountaineering/index.htm

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Books and Maps

Alaska Natural History Association

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